

PATENT SPECIFICATION
DRAWINGS ATTACHED

958,427



958,427

Date of Application and filing Complete Specification Feb. 14, 1962.

No. 5673/62.

Complete Specification Published May 21, 1964.

© Crown Copyright 1964.

Index at acceptance: —B7 G(8B5, 8K, 8X, 27B3, 28FX, 28J1, 28JX, 41A); B7 K; B7 W(3A1C, 3C4, 21, 25, 31C); F2 R

International Classification: —B 64 d (B 64 c, F 06 r)

COMPLETE SPECIFICATION

Land, Water and Air Vehicle

I, OGDEN LEE MARTIN, a citizen of the United States of America, of 1704 North "C" Street, Fremont, Nebraska, United States of America, do hereby declare the invention for which I pray that a patent may be granted to me and the method by which it is to be performed, to be particularly described in and by the following statement:

This invention provides a vehicle capable of operating on land, water and in the air as a heavier-than-aircraft.

According to the invention, the vehicle comprises a lift producing body having a curved upper surface and a substantially straight lower surface extending between leading and trailing edges, roll control surface members each hinged to the body about a fore and aft axis higher at the end nearer the leading edge and extending generally upward to form a channel with the upper surface, the control surface members being adjustable individually and an engine adapted to produce a propulsive airstream in the channel between the control surface members and above the upper surface.

In order that the invention may more readily be understood the following description is given merely by way of example, with reference to the accompanying drawings in which:

Figure 1 is a top view of an aircraft constructed in accordance with the invention;

Figure 2 is a side view of Figure 1.

Figure 3 is a front view of the aircraft in Figure 1.

Figure 4 is a rear view of the aircraft in Figure 1.

Figure 5 is a rear view of the aircraft in Figure 1 but showing the control surface members in a different position of adjustment.

Figure 6 is a top view of a modification, differing essentially from that of Figure 1 by the substitution of a different type of engine.

Figure 7 is a side view of the aircraft in Figure 6.

Figure 8 is a top view of another modification differing from that of Figures 1 and 6 in the inclusion of foldable wings.

Figure 9 is a side view of the aircraft in Figure 8.

Figure 10 is a front view of the aircraft in Figure 8.

In the accompanying drawings, there is a craft or vehicle 10 having a body 12 within which one or more passengers may be transported. The body has a section similar to an airfoil (Figure 2) and is capable of producing aerodynamic lift. Body 12 has a rounded leading edge 14, a rather sharp trailing edge 16, a smoothly curved upper surface 18 and a comparatively flat lower surface 20. The shape is selected from one of the NACA airfoils. The bottom surface 20 is formed by a thin skin over an air frame with the skin being airtight and having wheel wells within which the four wheels 22 are accommodated. Each wheel can be fixed or supported by an oleo strut or supported by some other standard structure for retracting the wheels when the vehicle 10 is in flight or travelling over the water surface. The wheels extend through the bottoms of two ski-like wheel housings 25 and 27 with flexible strips 29 along their lower outer edges. Also, there is a strip 31 of the same material, such as belting, on the rear edge of the elevator. Flap 33 having a flexible strip at its lower edge, is hinged to the front lower part of the body and extends transversely thereacross. The controls for flap 33 are connected with those of the rear elevator so that the strap along its edge may contact the runway when down.

Standard instruments, windows and other equipment required for licensing is contemplated. An observation bubble 26 of transparent material rises from the top of

[.]

the airfoil shaped body at approximately the maximum thickness station thereof. This is to achieve a full 360° plane of vision that is especially important in sea and land travel.

5 An engine 30 is mounted in an engine nacelle 32. The exhaust gas is piped by conduit 35 through the bottom of the craft. Also, a part of the propulsive blast can be piped under the body to form an air cushion 10 on landing and to add to the lift on the take-off of the flexible strip helping to maintain the air cushion. This is especially important for water take-offs. Engine 30 has propeller 34 for producing the airstream. The air-stream provides thrust and lift for the body. The lift is not so important in land and water travel but, of course, is essential for air travel. An engine support 36 mounts the nacelle above the upper surface 18 and considerably downstream of the centers of lift, pressure and gravity of the craft. Propeller 34 is located in an upwardly opening channel 38 whose boundaries are formed by the surface 18 and two control surface members 42 and 44. These members 42 and 44 provide aerodynamic control forces for the craft and serve as fins and means for lateral control and stability. They may be considered roll control surfaces. The members 42 and 44 are comparatively flat and elongated and are located near the sides of the body 12. They are mounted by hinges 46 and 48 on stationary fins 50 and 52 extending fore and aft of the body the hinges being higher at their 20 forward end and extending generally parallel to the chord of the body. The sides of channel 38 are formed by control surface members 42 and 44 together with stationary fins 50 and 52.

40 Combination ailerons and elevators 56 and 58 are mounted on hinge 60 at the trailing edge of the body. Rudders 62 and 64 are at the trailing edges of the fins 52 and 50. The controls 66 for the combined elevators and 45 ailerons 56 and 58 are standard, as are the controls 70 for the rudders 62 and 64. The controls can be cables that are attached to horns on the control surfaces and that are operatively connected with a control wheel, stick or the like in the cabin. The control assembly 72 for members 42 and 44 consists of a double acting cylinder 74 having two pistons with piston rods 76 and 78 extending from each end of the cylinder and pivoted to the members 42 and 44 or to 50 horns or brackets attached to these members. Three hydraulic lines 79, 80 and 81 are attached to the ends and centre of the double acting cylinder so that either or both pistons can be retracted or extended from cylinder 74 and thereby operate the control surface members 42 and 44. During this operation cylinder 74 is held stationary by means of lever 86 pivoted to the cylinder and extending to a servo or mechanical control in the 55

aircraft. When both control surfaces are moved in unison (see Figure 5) the entire assembly is moved by shifting the lever 86 from side to side and this operates both control surface members 42 and 44 for lateral control of the craft. Although control assembly 72 is illustrated on the exterior of the aircraft it is to be understood that this is shown this way merely for clarity and that the entire assembly is preferably mounted beneath engine 30 and within the confines of the body 12.

The bottom surface of the body, being substantially flat, generates a considerable ground effect to facilitate take-offs and landings. In addition this surface is excellent for water travel when the craft is used as a boat.

In Figures 8—10 there is a modification which has small differences of construction from the craft 10. Craft 10a has a body 12a of essentially the same shape as body 12. Stationary fins 50a are shorter enabling the roll control surface members 42a and 44a to be made with a larger area. The two rudders 62 and 64 are substituted by a single centrally located rudder 63.

Foldable and/or detachable wings 90 and 91 are attached to the body 12a. These will provide additional lift when the craft is used as a heavier-than-air craft. When used in any other capacity the wings can be folded about pivots 92 and 93 and latched in a position over the top surface 18a of the body 12a. Alternatively the wings 90 and 91 can be detached. The variation which involves additional wings 90 and 91 and alterations in the empennage control surfaces, may be made not only with the propeller driven models but also with the jet propelled craft 10b (Figures 6 and 7). The vehicle or craft 10b is constructed the same as the vehicle or craft 10 except that the engine 30 is substituted by a jet propulsion engine 30b. This is located in or on the body 12b with a jet pipe 109 in the region of the trailing edge 16b of body 12b. The specific construction of the engine is standard. However, there are two air scoops 104 and 106 that have air inlets 108 and 110 on the side of the body 10b to accept ambient air under ram pressure for the jet engine. A dual functioning air inlet 114 is at the forward part of the engine housing 32b and is controlled by a shutter 118. Hinge 120 mounts the shutter so that it is capable of opening and closing air inlet 114. A hydraulic cylinder 122 (Figure 7) is shown mechanically attached to shutter 118 for opening and closing air inlet 114. As indicated, the inlet serves two purposes. The first is to receive air to support combustion in the jet propulsion engine. The second is to bleed boundary air layer from the top surface of the body 12b and thereby function as a high lift device.

70

75

80

85

90

95

100

105

110

115

120

125

130

WHAT I CLAIM IS:—

1. A vehicle comprising a lift producing body having a curved upper surface and a substantially flat lower surface extending between leading and trailing edges, roll control surface members each hinged to the body about a fore and aft axis higher at the end nearer the leading edge and extending generally upwardly to form a channel with the upper surface, the control surface members being adjustable individually and an engine having means to produce a propulsive airstream in the channel between the control surface members and above the upper surface.
5. A vehicle according to claim 1 and including a wing attached to said body.
10. A vehicle according to any preceding claim, wherein said control surface members are hingedly mounted on, and form extensions of, stationary fins on the upper surface of said body.
15. A vehicle according to claim 1 and including a wing attached to said body.
20. A vehicle according to claim 2, wherein said wing is foldable.
25. A vehicle according to any preceding claim and including additional control surfaces rearward of the roll control surface members.
30. A vehicle according to any preceding claim, wherein said engine comprises a jet propulsion engine having an air inlet located in the channel rearwardly of that portion of the body which is of maximum height, thereby to increase the lift of the body.
35. A vehicle according to claim 5, wherein additional air inlets communicating with the jet propulsion engine are located outside said channel to receive ambient air under room pressure for feeding to the jet motor.
40. A vehicle according to claim 1, 2, 3 or 4, wherein means are provided to direct gas from said engine to the lower surface for discharge therefrom between ski-like housings extending longitudinally of the body.
9. A vehicle according to any of claims 1 to 5, wherein said engine has a propellor located at least in part within said channel.
10. A vehicle according to any preceding claim, wherein said control surface members are adjustable by means of a double acting cylinder having two pistons with a piston rod extending from each end of the cylinder such rods being pivotably connected to the control surface members, means being provided for selectively applying fluid pressure to the ends or centre of the cylinder to operate the pistons individually or in unison and means being mounted on said cylinder for bodily moving the latter simultaneously to actuate said control surface members in the same direction.
11. A vehicle according to any preceding claim, wherein the roll control surface members are adjustable by means of a double acting cylinder having two pistons with a piston rod extending from each end of the cylinder such rods being pivotably connected to the control surface members, means being provided for selectively applying fluid pressure to the ends or centre of the cylinder to operate the pistons individually or in unison and means being mounted on said cylinder for bodily moving the latter simultaneously to actuate said control surface members in the same direction.
12. A vehicle according to any preceding claim and including a transverse flap at the forward lower part of said body.
13. A vehicle according to any preceding claim wherein there are flexible strips along the lower outer edges of said body.
14. A vehicle according to any preceding claim wherein the axes of rotation of said roll control surface members extend generally parallel to the chord of said body.
15. A vehicle substantially as hereinbefore described with reference to and as shown by Figures 1 to 5 or Figures 6 and 7 or Figures 8 to 10 of the accompanying drawings.

J. A. KEMP & CO.,
Chartered Patent Agents,
14 South Square, Gray's Inn,
London, W. C. I.

958427

COMPLETE SPECIFICATION

3 SHEETS

This drawing is a reproduction of
the Original on a reduced scale
Sheet 1

Fig. 1

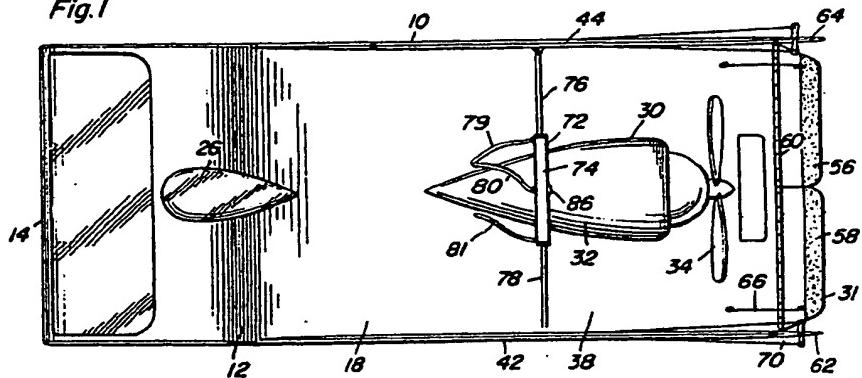


Fig. 2

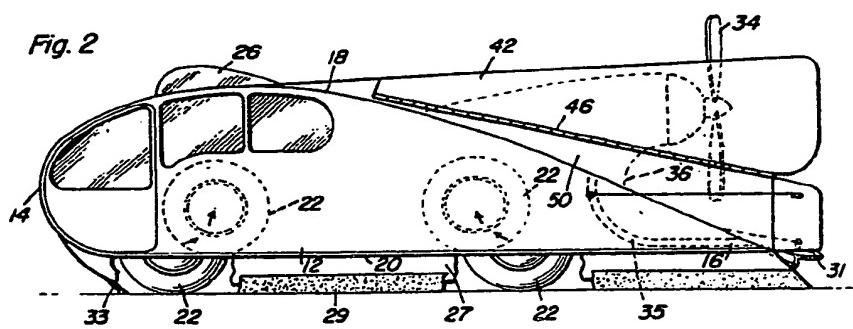
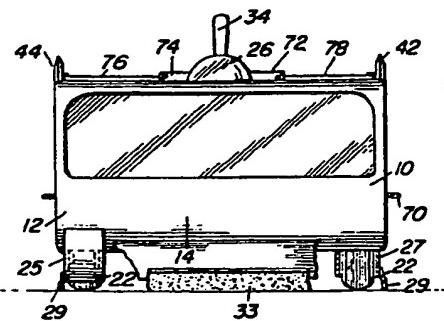


Fig. 3



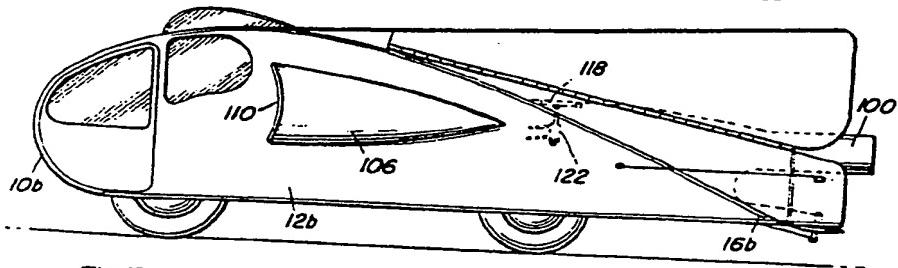
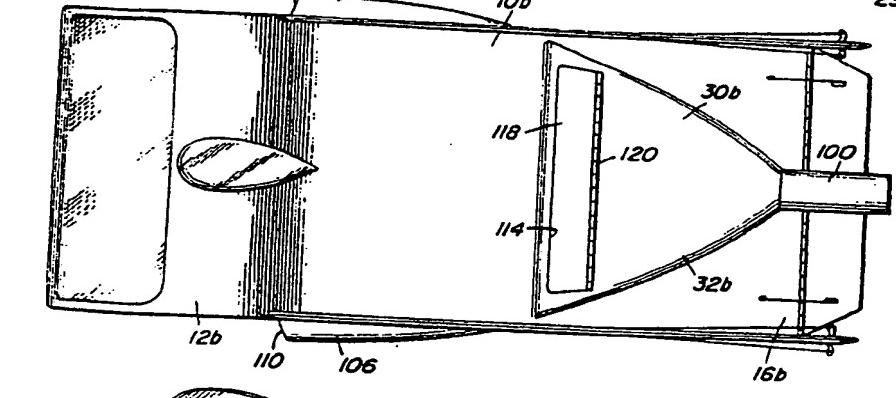
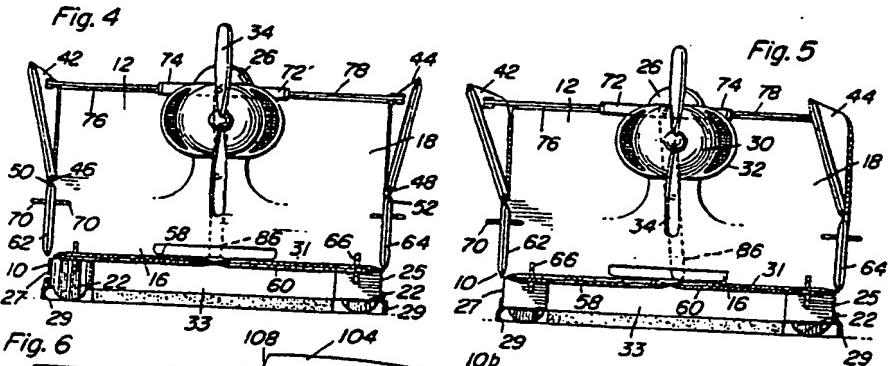


Fig. 7

THIS PAGE LEFT BLANK